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The Improvement of Live Stock.

BY

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DURING my six months' stay in Great Britain I had a particularly favourable opportunity of seeing some of the finest live stock in the British Isles and in fact in the world. A trip to Scotland during the Easter Holidays in company with a large party of Canadian soldiers took me to Ayrshire, the home of the famous dairy cattle of that name and a great centre for the breeding of Clydesdale horses and Border Leicester sheep. A week's stay in Cardiff attending the Royal Agricultural Show gave me a very representative picture of the live stock of England proper, for Scotch breeds and breeders were but poorly represented there.

It is not my intention to attempt to describe even a few of the many breeds of horses, cattle, sheep, and pigs which I saw. Certain general facts with regard to the breeding of live stock as illustrated in Great Britain are, however, not without interest to us in Mysore. The three things which struck me most forcibly at Cardiff and elsewhere were, the wonderful uniformity exhibited within the individual breed, the great variety of breeds,

and the extraordinarily high prices which were paid for well bred stock.

One may gain some idea of the variety of breeds when we learn that in Great Britain there are over thirty distinct breeds of sheep (twenty five breeds were exhibited at Cardiff) most of them very highly developed and adapted with the greatest nicety to the climatic and grazing conditions of the various different parts of the country and to specialized demands for wool and mutton.

The uniformity within these breeds is particularly wonderful when we consider that a very large number of them date back hardly more than 150 years and moreover have arisen through the crossing of two or more of the previously existing breeds with each other. How has this been possible?

In the first place we find that the history of almost every prominent breed of cattle, horses or sheep is associated with the names of a very few men—born breeders—who have practically modelled or formed the breeds the blood of whose stock runs in the veins of every member of the breed to day. These men were almost invariably the sons of experienced live stock breeders, and their work has been handed on to their descendants. At every place I visited I found the present owners of the herds or flocks or studs either the descendants of men famous in the history of the breed or else men of wealth who had as active managers of their estates men in whom work with live stock was, as it were, “bred in the bone.” In the second place the agriculturists of Great Britain were, in the early days of live stock improvement, quick to see the importance of good breeding and were prepared to pay high prices for stock whose reputation had become assured.

To give some idea of the value placed on live stock at the present moment I may mention the case of ‘Dunure Footprint.’ The owner of this Clydesdale stallion refused an offer of 30,000 guineas (roughly 4½ lakhs of rupees) a figure which it would be hard to match outside the annals of racing stock. The prize Shorthorn bull at the Royal Agricultural Show this year was sold for a sum exceeding 8,000 guineas (almost a lakh of rupees).

What lessons are there for us in all this ? In the first place, I think it is clear that if rapid and permanent improvement is to be brought about in our live stock,—and here I refer particularly to cattle and sheep, it will be through the efforts of a comparatively few men who are able to devote their serious attention to it. I fear it also means that the initial impetus will have to be given by Government as our breeders, and what breeders we have are practically confined to cattle breeding, are not, as a whole, sufficiently well educated or sufficiently daring to launch out on what must be new lines. In the second place, we must, I think, try to create a proper appreciation of the value of well bred stock. There has arisen in some quarters a demand for a restriction on the export of our good stock. If we are to take the experience of England as a guide in this matter such a policy of restriction would be about the worst that could possibly be followed. The British Live Stock Industry could never have reached the position which it occupies to-day had it not been for the large demand that has arisen in North and South America for British stock and the high prices that have resulted therefrom. The prize Shorthorn bull to which reference was made above was sold to a breeder from the Argentine and the Hereford breed of cattle owes its present prominence very largely to the demand from the cattle ranches of Western and Southern America.

Is there any part which the members of our Union can play in the development of our live stock industry ? I think there may be. Government are likely, in the immediate future, to take up seriously the question of improvement of both cattle and sheep in the State and I see no reason why some of our members who have ample lands and a fair amount of capital should not be able to co-operate in this work with profit both to themselves and to the State.

The Threshing Machine on my Estate.

BY

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Inamdar, Oorgahalli Estate, Bangalore District.

THE Inam village of Oorgahally lies at a distance of 3 miles due south of Bidadi Railway Station. It is about 2,200 acres in area and is made up of arable land and scrub jungle.

The home farm lands, wet and dry approximate to 100 acres. The wet land is encircled by the dry and together, they form a compact plot. Water for irrigating the wet lands is derived from two small rainfed tanks. To supplement this water supply, two 4 inch centrifugal pumps are used to pump up the drainage water of the irrigated fields. The main crops grown are sugarcane and ragi. The dry area is solely devoted to ragi crop, while the wet area is alternately made to serve for ragi and sugarcane cultivation.

I started agricultural work on a humble scale and had at first scarcely any difficulty to face in threshing the small yield of ragi crop. Step by step I extended the ragi and sugarcane cultivation and alongside of this extension threshing became more and more a difficult problem. Two causes contributed towards this. The larger production of ragi in itself made the task of separation of the grain by the traditional method, tedious, heavy and trying; and next circumstances so arranged themselves that it became what may be called a question of ragi vs. sugarcane. The threshing season was co-extensive with the preparation of soil for and the planting of sugarcane, and the two cultivations tended to mutual restriction. I had to go on with one at the expense of the other.

In this predicament I sought the advice of Dr. Lehmann, who was then at the head of the Agricultural Department in the Mysore State and asked him how he liked the idea of introducing a threshing machine on my farm. He visited my estate, took stock of my difficulties and was kind enough to tell me that he would bring a machine or two from Germany whither he was to go shortly; he got down two machines; a hand power

one and one to be worked by an engine, and both of them were found to be quite unsuited for threshing ragi. Next he wrote for a machine of the type which Canadian farmers largely used for wheat threshing. It arrived, and Dr. Lehmann wrote to me that experiment showed it would serve our purpose admirably. I saw the machine working on the Hebbal farm, and I thought that it was doing so under rather unfavourable conditions. So I intimated to Dr. Lehmann that unless I tried the machine on my farm I would not be able to form any opinion as to its usefulness. The doctor was good enough to send the machine across to me and I set it going on my farm. At first the results obtained had a damping effect on my servants, They grumbled at it and said that portion of the ragi that was given out had got smashed. But I continued threshing and with slight adjustments got out an efflux of ragi, rapidly enough and irreproachable. Working at the rate of 6 hours per day I got through my work in 8 days. If I had resorted to the ordinary method of threshing it would have taken, working even for 12 hours per day full 45 days. My servants and such of those as were witnessing the machine work were impressed with its advantages and in one voice voted it, good.

I returned the machine and placed an order with Dr. Lehmann for one, a size bigger. It came just in time for the threshing of the year 1908 and ever since it has been at work year in and year out and giving me the greatest satisfaction. The labourers specially love it; for it has saved them from a good deal of hard, summer labour. It has so to say removed the conflict between Ragi and Sugarcane and has left me free to extend the cultivation of one without detriment to that of the other. The machine cost me Rs. 650 and till now not a pie has been laid out either for repairs or renewal of parts; and I hope to see it going sound for a quarter of a century more. It has come from the firm of Messrs. Heebner & Sons, Lonsdale U. S. A. and the power used to work it is a $6\frac{1}{2}$ H. P. oil engine manufactured by Messrs. Hornsby & Sons.

A word remains to be added. With slight adjustments and variations of speed, the machine can be used for almost all kind farm crops, juar, cow gram, horse gram, pigeon pea &c., It

gives out 800 seers of well threshed ragi per hour and about one and a half times that quantity of horsegram in the same time. The straw is delivered in good condition and is liked by the cattle all the more. Nothing is lost by being crushed to dust and blown away by the wind. It gets off undamaged *en bloc*. And how about the threshing floor when work is being closed for the day ; not a grain of ragi or a blade of straw litters it.

Food in Germany during the War.

BY

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A brief account of the food conditions in Germany during the War by one who spent six long years in that country and experienced all the difficulties personally may not entirely be without interest to the readers of this Journal.

The effectiveness of the blockade naturally compelled Germany not only to have recourse to rationing very soon after the War started but also to increase the production of food. As the most important item stood bread first on the list. It was not only rationed out, but the very quality of it was altered. Home-grown rye was substituted for the wheat mostly imported. To get more meal out of grain, the effectiveness of milling was increased to about 95 %. To stretch the meal as far as possible, bread consisted of only about 60 % meal and 25 % potato starch or meal. The very process of baking was altered to suit the new composition of bread, and it was prohibited to sell bread till 24 hours after baking and every loaf was stamped with the date of baking. A new kind of bread was introduced which looked absolutely dark and was obtained by mixing fresh warm slaughter house blood with the meal used for baking it. Pure wheat bread was allowed only to the sick and the aged. To produce as much corn as possible, the area under sugar beets was cut down. On the very day that bread was being sold on bread 'stamps,' the innocent wife of one of the bakers in the town where I was, sold

bread taking only the stamps in exchange, thinking that she could get money on them at the Government Treasury.

The next important article of food was potatoes. Even before the War, the country itself produced more than enough to satisfy all her demands. In fact there was even a surplus after supplying the wants of the table, and it was used for feeding pigs and making starch, etc. For the table of the well-to-do and upper classes, a certain quantity of early potatoes was being imported in the spring from Holland. Mixing it with meal for making bread, as stated above, was one of the new uses it was put to. It had also to be used for making alcohol. The yield of the crop gradually went down in course of time, partly owing to the want of suitable manures and partly owing to increased difficulties of proper cultivation. To stimulate production, people got allotments from public land and produce from such small gardens was free from Government control and confiscation. Even beautiful private flower gardens and some of the places of public recreation were transformed into potato fields. In spite of all this, the demand could not be satisfied. Frost and other unfavourable conditions of weather too contributed their share in creating a dearth of potatoes. From the winter of 1916—17 when the temperature was between—20° and 25° C for six long weeks, it was decided to stretch the supply of potatoes by ordering the people to eat turnips, and prohibiting its being fed to pigs and cattle. To waste as little as possible people were advised to boil potatoes in the skin and then peel them for the table. When there was a demand for early potatoes, unscrupulous people whose chief aim was money-making, dug out unripe late potatoes and sold them as early ones till Government prohibited the digging out of the potatoes before a certain date. In some industrial centres and big cities people had no potatoes at all for weeks and weeks together, and difficulties of transport also contributed to this crisis.

Now about sugar, of which Germany used to export large quantities before the War. In the begining of the War period, a very liberal use of it was made. In it, people thought they had found a substitute for all their failing needs. It was even

used for feeding animals to a certain extent. The reserve stock was exhausted pretty soon. The production went down on account of the decreased area under beets to increase the production of rye so badly needed for breads. The army was badly in need of glycerine and a lot of sugar was needed to produce a little quantity of it during its fermentation into alcohol under certain definite conditions. Experiments were in progress to produce artificial protein by feeding yeast with sugar. Under such conditions the State had naturally to interfere, and sugar was confiscated and rationed out. Everybody got enough to sweeten a couple of cups of tea or coffee in the day; if they wanted more, they were asked to use saccharine which was also under strict control to prevent its being used for adulterating stuffs and selling them off as sugar. The confectioners were ordered to sweeten their preparations with saccharine only. The wine manufacturers were only allowed a limited quantity of sugar as much as was needed to sweeten the common qualities of wine. And this state of affairs in a country which was successfully competing with the cane sugar industry of the world.

Let us now turn to meat, a very important article of food in all countries of the West. The meat production of the country was dependant to a large extent on the foreign supplies of feeding stuffs, pig-fattening on the Russian barley, and beef-production on oil-cakes, etc. from the British Empire and America. People thought that they could fatten the pigs on potatoes, but that article was badly needed for human consumption. The State wanted the stored supply of feeding stuffs to last as long as possible, and that could be done only by making the number of animals to be fed as few as possible. The pig being an animal that multiplies very fast, a campaign of slaughter was organized against it, in spite of the protests and against the wishes of the people engaged in the industry. Part of the meat thus obtained was made into the usual sausages, and part was tinned. Many of the animals not being ripe for the butcher's knife, the meat was of very low keeping quality.

Intimately bound up with beef production was the production of milk and butter. There were extensive meadows and pastures to keep the animals in fairly good condition, but in winter, stall-

feeding was the only means of keeping them even alive. When the supply of pork began to get short, attention was turned to the wealth of the country in cattle, and they began to be slaughtered under Government orders. The inspection of the number of cattle owned by the farmers was very severe, and very few escaped the necessary conscription. Later on in the summer of 1917, the ration of bread had to be cut down, and it was decided to substitute beef and veal for it. This necessitated an extensive slaughter of the animals, and many a valuable breeding and milking animal had to be sacrificed. This compulsory slaughter of milking cows told heavily on the production of milk which was already low enough owing to the absence of concentrated feeds. At last milk too had to be rationed out. Little children, women in expectation and accouchement, the sick in the hospitals, and the aged *i. e.*, those beyond 70 years of age were given preference with regard to unskimmed milk. Others got only skimmed milk which was formerly given to pigs. Now and then one could get a small quantity of butter milk the supply of which entirely depended on the good will of the dairy people, that article not being rationed out.

As already stated, the supply of butter also decreased with the decrease in the yield of milk. The rationed out butter for the week was scarcely enough for a couple of slices of bread daily during half the week. The kitchen was entirely dependant on the rationed margarine and lard, and there were all sorts of recipes as to how to cook without fat, but of course, such food was not very palatable. It is of course not possible to write about all the necessities of life in a short article like this. The subject is by no means exhausted. With a few words on such articles of luxury as coffee and tea, I shall bring the article to a close for the present at least.

The supplies of coffee and tea did not last beyond a year, when substitutes for them were put upon the market and rationed out. Roasted corn and all sorts of wild nuts were the substitutes for coffee. The dark decoction got by using these had to be gulped down without milk or sugar mostly. Wild leaves and flowers were dried and sold as "Home-tea" and a vigorous propaganda was made for praising its virtues and advocating its

use even after the War. Of course, well-to-do people could always buy real coffee on the sly, but at enormous prices of Rs. 20 to Rs. 30 a pound.

Now a few words about the prices. Very early in the War, the State fixed the prices for all articles rationed out, but only the rationed supply of 5 lbs. of bread, a quarter to half a pound of meat and about 3 to 5 lbs. of potatoes per week per head could be bought without any difficulty at these prices. For all the others one had to make use of his dexterity even though at the risk of heavy punishment if caught red-handed. For a pound of butter, I have paid as high as 30 shillings and for a little bit of sun-light soap about 10 shillings. Many a time one had to buy all sorts of unnecessary articles even to get these at such high prices.

Power Ploughing, its scope and methods with special reference to Mysore,

By the Editor.

ONE of the important features of war time agriculture in Great Britain has been the use of tractors in ploughing, cultivating and other tillage operations to an extent which in pre-war days was not dreamt of. Horses were scarce and so were ploughmen, and the inexorable demands of the food situation could be met only by the use of some mechanical power for breaking up land, so that the most difficult and yet the most important operation of ploughing could be got through sufficiently quickly for the season. The import of American traction engines, the training of drivers, the ploughing of land by Government agency for the farmer with traction outfits, the ploughing by day and by night and on weekdays and Sundays, all formed part of a splendid emergency organisation. War time agriculture thus demonstrated to the British farmer the value of the traction engine on the farm and especially in tillage operations, and it has been appreciated so well that the method bids fair to become a permanent feature of British Agriculture. Manufacturers have not been slow to recognise this fact and great efforts are being

made not only to capture British custom permanently, but to push the trade into other countries as well.

The result has been that even the Indian agriculturist has been thought of as a likely customer and a strenuous campaign has been set on foot to create and foster a trade in machine ploughing outfits in this country as well. Now and again inquiries are received from agriculturists in our own state as to the scope and possibilities for the introduction of some form of mechanical power for ploughing in the hope that the problem of the scarcity of labour may thereby be solved. It may be useful therefore if we set forth in some detail some facts concerning power ploughing and the scope for its employment in our state.

It is not generally known that the use of mechanical power for ploughing is of very recent development even in the United States of America where alone among western countries its use may be said to be fairly extensive. The employment of power ploughing of any kind dates only within the last forty years; and its general use in America may be said to be only about ten years old; the famous tractor trials of Winnipeg held in 1908 may be said to mark the beginning of the great expansion of the traction engine and plough manufacturing industry in the U. S. A. Compared with the use of animal power, it occupies even to this day only a very minor place. The plowhorse still continues to be the source of power on the farm, and even the slow moving ox occupies a position of some importance as a draught animal on European farms. On the small peasant holdings in Germany and France it is not at all uncommon and even on some of the very large and up-to-date farms the ox team helps the farmhorse at the plough or cart, till weary with age and toil it is fattened off for the butcher.

It is the opening out of the large prairie farms of the United States with its almost unlimited extent of cultivable land and a very sparse population that really made the opportunity for power ploughing and it is in America therefore that it has made the greatest progress.

The forms of power ploughing are mainly only two. In one system the engine (or engines) which hauls the plough does not

itself move on the field to be ploughed. It remains on the headland, hauls the plough or other implement across the field by means of a long steel cable which it winds round a drum attached to its lower side, as it pulls the plough towards itself. The more common form is the use of two engines, which remaining on opposite headlands of the field work alternately, one pulling the plough towards it and winding the cable round its drum, while the other merely pays out its cable and vice versa at the next journey of the plough which now travels towards the second engine. A less common form is the use of only one engine carrying two sets of cables; standing at one end of the field it pulls the plough (or more frequently only a heavy grubber) across the field between two anchors by means of the cables suitably fed through pulleys fixed to the ground at the corners of the field. The essence of both the systems is the fact that the engine does not travel over the field. The double engine system commonly known as "the Fowler's Double Engine System" has been the most favoured in England and though the oldest it still remains the most perfect for this style of ploughing.

Where the work of ploughing is very difficult on account of the depth of ploughing or the nature and condition of the soil or the number of ploughs in the gang, and where the moving of the engine over the field is not desirable, the Fowler's Double Engine outfit is practically unrivalled. The engines are very powerful (about 40 B. H. P. being their capacity) and the whole of their power is utilised for hauling the plough without any being lost in hauling its own weight at the same time as in the case of second method to be explained presently. This type of ploughing outfit has remained practically unchanged; steam is the motive power, and the whole ploughing tackle consists of two steam engines, a six bottom balance plough, cables, water cart, coal waggon and other accessories. Such an outfit will cost not less than Rs. 40,000.

The second form consists of an engine which hauls itself over the field pulling a plough or other cultivating tool behind it, much in the same way as horses or oxen do. This form known as tractor ploughing involves therefore the movement of the

heavy traction engine over the field, with its liability to pack the soil or where underdrains are laid, to damage and impair their usefulness. There is further the difficulty of moving over ploughed ground where a cultivator or harrow has to be used after the ploughing; and again the expenditure of power by the engine for hauling itself in addition to the heavy work of ploughing. The simplicity and comparatively low cost of the outfit are however in its favour, and even the liability to pack the soil and other objections have been found to be the result of more or less prejudice, which recent experience during the war has helped to dispel.

A somewhat important variation of this form is furnished by the 'Motor Ploughs,' which are small outfits in which the plough forms an integral part of the motor and does not as in the case of tractor ploughs trail behind. The outfit can turn at the head lands within a narrow sweep and the plough and motor can be operated with great ease by one operator.

In great contrast with the Fowler system, tractor ploughing has undergone great improvements. Steam tractors have given place to the internal combustion engines which run on petrol; these again except in the case of the small motor ploughs have been displaced by engines which start on petrol and run only on kerosine. To enable the tractor to move on soft ground, or on ploughed soil with ease, special wide wheels with studs are provided which can when necessary have "extension" rims fitted on to them to negotiate specially soft ground. With the same object too engines with "Caterpillar" wheels which practically lay their tracks and move on them, and which have proved a great success during the war in the mud and slush of the battle fields in Belgium, have also come into use. Furthermore these engines are also made in many sizes suitable for both light and heavy work: the cost too is low compared with the Fowler system, about Rs. 5,000 may be said to have been the cost of the lowest priced tractor until the "Fordson Tractor" now put on the market brought it down as low as Rs. 3,500.

What is the scope for power ploughing in Mysore?

Power ploughing is associated with large farms, capitalist farmers, good farm roads, large level fields and so on. It is true that

many of these conditions do not exist in Mysore. The holdings here are small and scattered and average only about 6 acres; the peasantry is mostly poor; and the large land holders are so only in name for few of them farm their own lands; others are at the mercy of the small cultivating tenants among whom the land is parcelled out. The country is very undulating and the rural roads are very poor specimens, being only fair weather cartracks cut up by numerous gullies and unbridged streams. The valuable irrigated lands under tanks and river channels are laid out into very small paddy flats and in the latter areas also into steep terraces, neither of which can be much altered. All these are perfectly true and will almost justify one in concluding that there is little scope for the introduction of these large scale ploughing outfits.

There are however special circumstances and situations within our state which will make it quite desirable and even necessary that some kind of power plowing should be introduced. Foremost among these is the question of ploughing the black cotton soils in the hot weather sufficiently deep to get rid of *hariali* grass. *Hariali* is a serious pest in these soils, reducing the cotton yield considerably and if not rooted out once in five or six years over runs the field and makes it unfit to carry any crop. In order to eradicate this pest farmers have their fields dug about a foot deep in the hot weather. This is however very slow and costly, and little more than a fifth or sixth of a man's holding can be done in a year. But labour is becoming so scarce and dear that it will be soon impossible to carry out this work by manual labour to the extent necessary. Heavy wooden ploughs and latterly heavy iron mould board ploughs requiring six or seven pairs of bullocks are being used by some farmers to do this hot weather ploughing; but though quicker than the method of hand digging this is not quick enough and requires considerable co-operation on the part of farmers. Power ploughing will be greatly appreciated under these conditions.

Secondly is the question of ploughing to a depth of 5" or 6" in the ordinary dry lands and to a depth of 9" in sugarcane lands of large land holders where the land is flat and

the fields large and conditions favourable in other respects. The dry land fields of Mysore are fairly large; individual fields of two or three acres can be commonly met with; the fields are divided by wide strips of unploughed land which nominally serves as the boundary but which really serves as a small grazing ground during the cropping season. Being quite wide enough for the use of carts these will furnish all the head land that may be required for the turning of a tractor plough. These fields will be all the better for an occasional ploughing to a depth of 6" as they are seldom ploughed more than 4" with the ordinary country ploughs and the soil under this depth is hard, forming sometimes even the typical plough pan. Many landowners will be glad in these days when manual and bullock labour is becoming very difficult to obtain to have their land ploughed by power ploughs, provided the cost is not very high. The number of such farmers may be small but quite large enough for a state where at first sight it may be thought there was little or no scope for power ploughing. The same may be said about the owners of sugarcane land which requires somewhat deeper ploughing than their animals and ploughs are capable of.

The cost will practically be the deciding factor. The trials conducted in foreign countries and the data of cost and capacity arrived at there are not of much value to us because conditions are very different in this country; the experience of the Bombay Department of Agriculture with the Fowler Double Engine ploughing outfit has amply demonstrated that such trials could not be relied upon for this country.

Some trials have indeed taken place both by the departments of agriculture in British India and also by enterprising individuals. The Bombay Department of Agriculture has for some years been working two Fowler Double Engine ploughing tackles in the black cotton soil areas in Guzarath and in the Southern Mahratta country. A similar one was got out and is reported to be doing good work in the Punjab by Sirdar Jogendra Singh (Editor "East and West"); in the Madras Presidency also we understand, that one such outfit is in use by a private company in their estates. In Central India,

H. H. the Maharaja Scindia of Gwalior has been very keen on the use of tractors for ploughing and this system is being given fairly extensive trial by the Department of Agriculture in that State, the tractor called "Mogul" of I. H. C. of the United States of America being used for the purpose.

The "Fordson" ploughing tractors designed by the marvellous Mr. Henry Ford of America and newly put on the Indian market is reported to be coming into use, and some have been already purchased by the Departments of Agriculture, planters and large landowners. Thanks to Mr. A. Mac. Isaac of Gangenhalli Estate and one of our members, who has got one of these tractors, our own State can claim credit for being one of the first to use the machine.

Even the motor ploughs have not been neglected, for the Bombay Department of Agriculture and the Pusa Research Institute each got out a "Fowler Wylie" Motor plough and Sirdar Jogendra Singh mentions certain trials with the "Ivel" motor plough conducted by him.

Low initial cost compared with simplicity is in favour of the tractor ploughing outfits as compared with the Fowler system of ploughing. For general ploughing work other than that required for the black cotton soils these will without doubt amply suffice; should trials prove that they will be equally efficient for these soils also, there will be considerable scope for this kind of outfit. Probably with the use of large disc ploughs, instead of the usual mould board ploughs, tractor ploughing may be suitable for these soils; the Spalding deep tillage implement is worth a trial drawn by a tractor on such soils. The still simpler type of ploughs *viz.*, the motor ploughs also have much to be said in their favour provided they are found suitable. Of course for any of the requirements mentioned above they cannot be thought of. For the ordinary annual ploughing such as is given by our ryots, it ought to suit very well; many of our young men who would spurn to hold the plough walking behind a team of plough bullocks would gladly run a motor plough be it of a riding or a walking type. Farm operations would be speeded up and the labour difficulty considerably got over. Unfortunately in the case of these, trials have been confined to only one or two types so

far as we know and even with these they have not been very thorough.

The trials conducted so far furnish some data as to the cost of power ploughing in India. With regard to the Fowler system figures of cost have been published by the Bombay Department of Agriculture and Sirdar Jogendra Singh. In their Annual Report for 1917-18 the Agricultural Engineer, Bombay, states that Rs. 28-0-5 an acre will have to be charged if the outfit is to work without loss. This of course is a very special ploughing operation, that is to say, in heavy black cotton soil, in the hot weather and more than 1 foot deep. It may be pointed out that the department undertook to charge only Rs. 17 an acre before actual trials were conducted and experience of Indian conditions gained. As regards tractor ploughing, figures are given by the Department of Agriculture Gwalior State in the Annual Report of that department for 1916-17. The cost per acre is worked out at Rs. 4-2-6; ploughing was under very favourable conditions, the soil being a light sandy loam, the depth of ploughing only 6."

It cannot be said that Mysore offers little scope for the introduction of power ploughing outfits. What is wanted is an organisation to bring it to the notice of the people, to push the sale, to furnish spare parts at short notice; to put men in the way of using them correctly, to attend promptly to any defects or difficulties in the working and so on. The "Fordson" is evidently being provided with all these requisites and an excellent organisation we understand is under contemplation which will grow hand in hand with the sales in this country. The many uses the tractor can be put to on the farm besides ploughing, such as furnishing power for pumping water, threshing grain, driving a sugarcane mill and so on may be the means of stimulating the use of machinery in agriculture. There is extensive land in Mysore lying undeveloped chiefly owing to a scanty population and primitive appliances and the introduction of mechanical power for agriculture will be the quickest way of bringing much of this land under cultivation.

Orobanche on Tobacco.

BY

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THE Tobacco crop is raised on a comparatively small area in



the Mysore State the area under this crop as per recent reports being 13,373 acres against a total cultivated area of 65,22,670 acres in the State. It may therefore be argued that a study of the diseases of a crop occupying such a small area was not very important. But the crop is so valuable and the effects of this disease so markedly affecting the quality of the tobacco leaf, that it is worth while to combat the diseases to which it is subject.

The accompanying table gives the area under tobacco in the several Districts of the State.

Bangalore	...	208
Kolar	...	1151
Tumkur	...	1580
Mysore	...	5912
Hassan	...	1538
Shimoga	...	205
Kadur	...	486
Chitaldrug	...	2198

Yedatore and Hunsur being the two taluks where tobacco is most extensively grown.

Among the pests that have been noted is orobanche (Kannada, *kasa*) several species of which grow in India. This belongs to a group of parasites known as 'orobanchaceae' which is represented in India by 5 genera *eginetia*, *christisonia*, *orobanche*, *cistanche*, *boschinackia*, the last two with one species. *eginetia* with two, *christisonia* with 9 and *orobanche* with 11.

In Mysore orobanche is represented by only one species orobanche aegyptiaca (?) 2 specimens of which are given in the accompanying page. The seeds are so minute and are so much like tobacco seed that they mix with the tobacco seed and are thus propagated from season to season. The parasite grows near the tobacco plant and goes on sapping the nourishment from the tobacco as a result of which the tobacco leaves droop and their quality is interfered with. They can be seen only when they come to flower and the usual method adopted is to pull the flower bunches out when they appear. Mollison has remarked "Although constantly removed by the cultivators a bad attack will destroy a quarter of the crop. The practice of continuous tobacco growing is so common and so favourable to vacumba (orobanche) that it is impossible to eradicate it. It more or less appears every year. Cultivators think that vacumba is an out-growth from tobacco and has no separate existence. It is therefore left in undisturbed possession of the field when the leaves have been harvested. It flowers and seeds on the tobacco stalks. These stumps are left to dry in the fields instead of being dug up and burnt as they ought to be."

The results of experiments carried on in America indicate that nitrogen and potash manures are most beneficial to tobacco and that the effect of phosphates may be discounted. The soils on which tobacco is growing are generally rich in Potash and as such nitrogenous manures would be useful for the tobacco crop. Such being the accepted idea, a manure like Sodium nitrate ought to be beneficial in giving the tobacco crop a vigorous growth to withstand the attack of orobanche. Sodium also provides the ingredient found in salt which is considered

beneficial in the Kaira and Baroda areas where certain salt water wells have considerable reputation as good sources of irrigation for this crop.

But as a result of more recent work Dr. Shaw has come to the conclusion that sodium nitrate is not a preventive against the occurrence of this pest. Heavy applications of manure may lessen its attack temporarily, according to Koch, but as a result of extensive experiments Peters and Schwartz have concluded that no chemicals have been found useful against this pest. It resolves itself into a question of hand-picking in proper season which can be easily be done in places where labour is cheap and the crop valuable as tobacco.

Other species are also known to attack mustard and other crops and as such a very careful watch is necessary to prevent orobanche appearing as a wide spread disease in the State, where till now only stray cases have been reported and the damage done comparatively slight.

The Manufacture of White "Bura" Sugar at the Gannerlahally Sugar Works of Mr. M. Rama Reddiar, Bowringpet Taluk, Kolar District.

BY

D. B. Sivarama Rao, L. Ag.,
Agricultural Inspector, Kolar Range.

THIS note has been drawn up with the object of giving a rough idea as to how white sugar is made from sugarcane without the help of costly machinery and appliances. The method outlined below is the one that is being carried on in different places in three different Taluks of the District, *viz.*, Kappalamadagu in Mulabagal Taluk, Gannerlahally in Bowringpet Taluk and Yeldur in Sreenivasapur Taluk.

The various operations are:—The juice after crushing goes to the boiling pan after straining. The juice is boiled until the scum rises; this is then removed with ladles. After the removal of the scum and when the juice begins to boil, a little gingelly oil or ghee is added to check the violent ebullition and at the same time the fuel in the furance is

reduced. When the charge begins to assume a semi solid consistency, vigorous stirring is resorted to. At a certain definite concentration *i.e.*, somewhat earlier than required for making jaggery the pan is removed from the furnace. The contents of the pan now called "Rapu" are kept stirred for some time and allowed to crystallise and then transferred to small earthen-ware pots until required for making sugar. The sugar known as "Bura sugar" is made from this. Most of the sugar-cane ryots merely prepare the "Rapu" and sell the pots of Rapu to sugar-makers as described below. The further work in the making of sugar is carried only by a regular trader. The process requires a good deal of supervision and establishment. It is this crude product or Rapu that is purchased by Mr. Reddiar ; in addition he prepares some Raper out of his own sugar-cane crop also. Mr. Reddiar controls all the sugar-cane cultivation of his neighbourhood by advancing large sums of money to the cultivators for their cultivation and family expenses ; he thus secures the the whole outturn. The gentleman also sends out his trained men to the various neighbouring boiling houses to help them in getting the stuff at the right stage and also supplies them with pots free of charge. The earthenware pots containing the Rapu are then punctured at the bottom and kept over a reservoir—vat covered with bamboo tatties or framework—so as to allow all the molasses in the pot to drain off into the reservoir. The reservoir is built in an airtight room. The pots are kept in this state for about 3 or 4 days on the reservoir to drain off all the molasses. After 4 days the pots are broken and the crude product is filled into big bamboo baskets of cylindrical shape—4 ft. diameter and 3 ft. high in the following manner :

One fourth of the basket from the bottom is filled with the crude "rapu" broken very coarse into very large lumps, the second quarter with less coarse lumps the third into still less and the top filled with the powder. The object of putting the stuff in lumps from the bottom is to facilitate the drainage of molasses. On the top of this, layers of green moss locally known as "Pache" are spread uniformly about 3 to 4 inches in thickness. After five days the green moss is rolled up and the stuff in the basket pressed and powdered by chopping with a

bill-hook and fresh moss is put in its place the old moss being placed over so as to increase the weight. Each basket takes about 6 changes of moss which means about 30 days. The process should be repeated twice over by which time all the molasses is drained. The sugar is then taken out, spread on a piece of coarse cloth on a hard piece of ground in the sun and is then well trodden with the feet until it has been reduced to coarse powder. This sugar is called "Cheni". Cheni sugar is made in this way in the season and a large stock is kept for preparing "Bura Sugar".*

Preparation of Bura Sugar.

Four bags of cheni Sugar (30 maunds at $7\frac{1}{2}$ mds. a bag) is dissolved in water and boiled in a pan by adding milk at the rate of 4 seers for every bag of sugar put in, and boiled up to the stage known as "Dodda Adige". At this stage the pan is removed and the contents kept as a stock solution for the day. At the time of boiling all impurities are carefully skimmed away. After the preparation of the stock solution generally $\frac{1}{16}$ of the stock solution yielding about 2 mds of sugar is taken at a time and boiled in a separate pan. At a particular stage suited for sugar making which can be judged only by an experienced practical man the pan is removed from the furnace and the contents transferred to another pan. In the new pan five men kept it constantly stirred (going round and round the pan) with wooden ladles and in the process of stirring we get pure, beautiful, white sugar; this is called "Bura Sugar" also known as "Kolar Bura". Generally one set of 6 men do about 30 mds, of sugar a day working from 7 A.M. to 3 P.M.

The stock solution is made just in the morning enough for the day's use.

The following is an estimate of the expenditure and receipts of the business:—(The rates are those which, prevailed during the months of March—April 1919:)

* A sugar centrifugal machine has been supplied by the Department of Agriculture to Mr. Reddiar, which will get through this tedious thirty days' work in about as many minutes.—Ed.

	Rs.	A.	P.
30 Maunds of <i>rapu</i> or 30 pots			
at Re. 1-8-0 per Md. ...	45	0	0
Making charges for the same ...	0	8	0
30 pots ...	1	0	0
Carting the above to the <i>Malige</i> ...	1	0	0
Charges for puncturing pots			
and breaking the pots and filling			
them in to baskets ...	1	8	0
Cost of baskets ...	0	8	0
Cost of preparing <i>cheni</i> sugar ...	2	4	0
Cost of preparing <i>bura</i> ...	3	12	0
Depreciation, interest, etc. ...	2	8	0
Cost of converting Molasses into			
jaggory ...	1	0	0
Miscellaneous ...	1	0	0
Total ...	60	0	0

Receipts :—

15 Mds. of <i>bura</i> sugar at Rs. 4-12-0			
per maund ...	71	4	0
10 Mds. of Molasses at 12 as. per			
Maund ...	7	8	0
Total ...	78	12	0

Therefore the profit will be Rs. 18-12-0.

The per centage of *bura* sugar from *rapu* is 50 %.

NOTES AND COMMENTS.

BY THE EDITOR.

WE invite the attention of readers to the interesting article on "Food in Germany during the War" by Dr. Narasimha Iyengar in the current number. Dr. Iyengar resided in Germany throughout the period of the War and his graphic narrative is the result of personal experience of the terrible time Germany in common with the other belligerent countries passed through. Resourceful though Germany was it will be seen how idle was the boast of Von Bern hardi and others that Germany was self-contained in every respect and could snap its fingers at any seige or blockade.

An Agricultural Middle School for Madras.

The Madras Government has recently passed orders regarding the opening of two Agricultural Middle Schools in that Presidency. We have not seen the recommendations of the Special Committee appointed for submitting proposals in the matter on which the order has been passed. We hope, however, to be able to publish it in our next number. Meanwhile, we are only sorry to observe that things move very slowly indeed. The ball was set rolling at the meeting of the Board of Agriculture in 1917 and the first of the two Schools is to be opened only in May 1920 if then, for we note that plans and estimates for buildings are to be drawn up, sanction obtained and the buildings completed before that date. The arrangements, however, seem to have received very careful thought with a view to give the experiment the very best chance of success. The course is evidently one of two years, provision being made for 20 pupils for a year. A suitable text book is to be written by a competent officer. Two agricultural teachers trained in teaching methods in addition to a third teacher for general education comprise the staff. We wish the experiment all success.

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Employment of Agricultural Graduates.

Our members and those contemplating to join an Agricultural College will be glad to read the following statement, which Dr. Mann, lately Principal of the Poona Agricultural College makes in his Annual Report for the year 1917—18 :—

“The demand for Agricultural Graduates is increasing and their value in the market is rapidly rising. This year several of the graduates of the College both new and old have been employed by private firms and companies engaged in cultivation or in other agricultural work at very good salaries. And as I write I have a number of applications in hand for men to fill whom I cannot find satisfactory candidates. The difficulty which existed some years ago as to the employment of such students as had not their own land to cultivate, seems to have disappeared.”

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A Device to Prevent Young Bulls from Mating before their time.

Certain ryots are very careful that their young male stock especially selected ones reserved for breeding purposes or to be reared into a specially well-grown stock do not deteriorate by early immature mating with cows in the herd. A curious yet very simple device for this purpose came under our notice in the Chitaldrug District. It consists in tying a large piece of gunny bag from behind the hump of the animal, so that the gunny sheet hangs like a screen between the forelegs and hind legs of the animal and nearer to the forelegs than the hind legs. The gunny apparently causes little inconvenience to the animal in roaming about but the effect of this arrangement as an impediment when the bull tries to jump a cow is obvious. It dispenses with the necessity for tying the animal up or keep him always under his master's eye. A more ingenious and simple method it will be hard to think of and we commend it for trial by owners wishing to check over—masterful young stock requiring similar protection.

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The Organisation of the Milk Supply to Cities from rural areas.

It is well if those wishing to improve the milk supply of

cities realise that the supply should be mainly, if not wholly from villages more or less far removed from the City. The keeping of cows inside city limits is hardly remunerative in spite of the fact that the milk is sold at practically prohibitive prices. The time too may not be far off when in the interests of the City sanitation cow keeping within city limits may be absolutely forbidden. The various aspects of the organisation of supplies from far off villages, such as collecting in central village depots, the cost and the method thereof, the organisation of the transport by rail or road, methods of preventing deterioration in transit and in the city depots, the city delivery problem and the many details in connection with it, will have to be studied and the best arrangement decided upon. Even the best of *apriori* ideas will avail anything. Experimental concerns will have to be started and worked so that the difficulties may be realised and solved as they arise in the manner best suited to local conditions. An account of a small attempt of this character for supplying milk to Poona City is given by Dr. Mann, Offg. Director of Agriculture in Bombay, in a lecture delivered before the Deccan Agricultural Association and published in the Agricultural Journal of India, Vol. XIV, Part IV. As a result Dr. Mann calls attention to the fact that the milk yield per animal is very low, that the village supply varies from season to season within very wide limits; from 140 gallons in the cold weather to as low as 30 in the hot weather in one group of villages investigated; that the price often is so high that the transport for sale in the city cannot be thought of, but that villagers agree to keep good animals and sell milk if a custom is assured; at the receiving depots in the village genuine milk is brought as a rule, the fear of losing custom at their door acting as a sufficient deterrent against adulteration which could be easily detected; night milk, *i. e.*, milk drawn between 7 P.M. and 8 P.M. and delivered 12 hours later to city customers rarely spoiled but there was the risk; with the morning milk which was delivered at 2 P.M. the danger of souring was great. Cold well water will do for cooling the milk, but it was found necessary to instal a pasteuriser. Dr. Mann estimates that with a supply of 1000 lbs. of milk a day (dropping down to 500 lbs. in the hot

weather) purchased at 15 to 16 lbs. a rupee in the collection centre provided with pasteurising arrangements, a monthly profit of Rs. 100 to 200 can be made on an initial expenditure of Rs. 2,500. His figures relate to a collection centre situated at an hour's run by rail from the city.

The Fordson Tractor at Gangenahalli Estate.

We had the pleasure of witnessing the Fordson Tractor at work on the Gangenahalli Estate, Magadi Taluk at the invitation of Mr. Mac Issac, the Proprietor of the Estate and one of the members of our Union. The tractor had suffered badly during its transport by rail from Calcutta to Bangalore. Various parts had been stolen, some like the sparking plugs had been extracted and replaced with inferior ones, a few parts broken and the engine itself filled with water. The tractor was set in working order in a way by one of the local engineers and the first task performed was to haul a three-ton boiler from the old pumping house at the river bank up to the bungalow through the estate, then to Bangalore along 11 miles of the steep and winding Magadi Road. The same work was repeated with another boiler and various parts of pumping machinery from the same spot. It is related that when about 15 years ago all this machinery had to be taken to the estate from Bangalore, it was four days' work for a couple of elephants. The "Fordson" was doing the hauling in great form. After the arrival of the Company's engineer, who pronounced the tractor was in a very bad state, it was partially mended and put to ploughing. The ploughs consist of two 14" plough bottoms of chilled iron and are so mounted that they can be easily operated by the tractor driver from his seat and put in and out of action with ease and in a moment. The ploughs also have a cutting disc in front and a skim coulter between the disc and plough point. It was adjusted to plough 9" deep but as the land had never been ploughed more than 4" deep at any time, the soil below was hard and only 6" to 8" was ploughed. The work, the speed at which the tractor was driven, the tearing of the soil, cutting through tree roots the size of a man's forearm, ploughing narrow bunds with the tractor at a considerable slant, and the ease of turning in circles or 'eights' of very

narrow compass as occasion may require, were remarkable. After ploughing, the land was gone over with a Martin's cultivator to see if and to what extent the ploughed soil packs. We can say emphatically that there was very little of packing. The tractor was then driven to the wet land below the tank. Mr. Mac Isaac had a heavy growth of horsegram in this area which he wanted ploughed under for green manure. Being paddy flats the fields had been laid out in terraces, but Mr. Mac Isaac wanted to test the machine on such land also and to tear up the narrow bunds overgrown with deep rooted grasses. The soil was in excellent condition and the plough went merrily along cutting the soil like butter and covering the dense growth of the horsegram. The bunds on the steeper terraces could not be negotiated, as the height of the bunds was more than the clearance of the tractor. These therefore had to be cut down a little so that the tractor bottom may clear them.

As the belt pulley attachment had not arrived this part of the work of the tractor could not be demonstrated.

As the tractor was not all in tune, we were advised not to test its capacity, oil consumption, cost of ploughing an acre and other important matters at these trials. The damaged parts will be replaced soon and we hope to be able to test the outfit soon after and publish the results in the next number of the Journal, should the trials be made in time for that number. But this much can be said at this stage; power the tractor has in plenty for all the work that may be required on a farm; its ease of manipulation and the narrow sweep of the turn are remarkable; it can haul itself about anywhere where a country cart can and probably even where it may be impossible for a cart. We wish it could be tried on the black cotton soils for hot weather ploughing; it will be heavy work; but should the Fordson be equal to the work, it will have everything in its favour.

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The Utilisation of Waste Lands.

Even the casual traveller in this State who gathers his impressions through the window of the railway car cannot fail to have been struck by the large stretches of waste land that as a matter of fact constitute no small feature of the State. Accord-

ing to the returns there are nearly one million acres of such land, but even of the 8 million acres of the land returned as under occupancy a large area of over a million acres is left untilled for various reasons. Even making allowance for that uncertain and elastic acreage comprised by the village communal grazing grounds, the area of these wastes should be very large indeed. Will they ever be opened up and put to profitable use? We are led to speculate in this matter by the perusal of the insistent writing in recent English and American Journals of the scramble that is sure to come for the world's raw products of economic value most of which will have to be supplied by countries geographically situated as we are. Vegetable oils, dyes, tannins, fibres, etc., the demand for these will come not only from importing countries but from within India itself in an ever increasing measure. The prices of many articles of even purely Indian consumption which used to be considered forest products gathered from trees growing in a state of nature and receiving little cultural attention from man have risen so high as to justify their being raised as regular plantation crops. We think there is unlimited scope for development in this direction. We are aware that it is considered that only the lands that are really unsuitable for crop raising have been left in this condition: we do not believe in this view. There are hundreds of acres in the State suited admirably to a variety of crops. So-called waste lands considered as unprofitable are converted into cultivated land carrying as good crops as any field round about the area provided they are given over to landless ryots. Have we not seen land left to jungle for probably hundreds of years now carrying excellent plantations of mangoes, casuarina, cocoanut, tamarind and so on? We have no doubt that in the pre-coffee days croakers must have said the same thing about the hill slopes of our coffee tracts now clothed with these magnificent plantations under the enterprise and capital of European planters.

Plantations offer good scope for even the small capitalist farmer; they do not involve the same labour as the annual field crops; the hardier among the plantation crops will require little attention after they are once established; large

areas can be farmed, labour-saving tillage tools can be used. In fact, with our present scarcity of labour and with land extensive and cheap there is no other profitable use one can think of. There are however signs that our farmers are moving in this direction. The cocoanut plantations in the Tiptur, Chiknaikanhalli, Arsikere, Sira and the adjoining taluks which are rapidly increasing in extent is a notable sign. The very large business being done lately by sellers of mango grafts from the Salem District as well as by local nursery-men here testifies to the extension of the orchards. But these are only a drop in the ocean. Many orchards, tamarind and soap-nut plantations, aloe fibre, casuarina, ippe (*Bassia latifolia*) deserve attention, for all these thrive excellently well in the State and their produce is becoming increasingly valuable.

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Model holdings in Gwalior.

We have perused with great interest the Annual Report of the Gwalior State Department of Agriculture for the years 1916—17 and 1917—18 recently to hand. The department has evidently been organised in a liberal and progressive spirit. Under the general guidance of Mr. B. Coventry, the Agricultural Adviser to the Central India States, and late Director of the Pusa Research Institute the staff includes Mr. Sam Higginbotham, Director and one of the most optimistic of the Agricultural Officers in India, two Assistant Directors and an Agricultural Engineer, all recruited in America; in addition, a number of local men for the subordinate appointments. The plan of work of the Department is more or less of the usual type but two features are quite novel and may be referred to specially.

One of these is for the department to take up a few villages under its control and to so improve them agriculturally and otherwise that they may become models for the Zamindars to copy. The order of the Durbar runs thus:—

“The Director will select one village in each district out of the list of *Kham* villages that will be supplied to him by the Revenue Department. The selected villages

will be handed over to the Agricultural Department on lease and the Agricultural Department through its Zileendars will be expected to improve the villages so as to be models for other Zamindars."

We are not in possession of any details of the scheme and as far as actual work is concerned, little could be recorded as the scheme is yet in its infancy ; but from the report of progress of one of these villages it is seen that the improvement is not confined to agriculture merely but embraces many other spheres of activity somewhat on the lines of the " Model Villages " contemplated and programmed for in our own State under the auspices of the Economic Conference. Thus, this particular report records the establishment of a village panchayet, a village School, a village granary for selected seed, (or 'Seed Depot' in Mysore parlance), experiments in the improvement of the lac industry "so that a man may take up this work in his spare time and get a good income" (the 'subsidiary occupation' of the Mysore scheme), the planting of alce as hedge and fibre plant and so on. The report also claims that 63 acres of land, have been cultivated apparently by improved methods. The Department is no doubt put on its mettle so to say and we shall watch the progress with great interest. It is a familiar challenge to the Agricultural Departments all over India by the ryots, "Put yourself in our place and show us what could be effected by way of improvement". The Gwalior Department has evidently been made to take up the challenge. The scheme will certainly reveal to us the ryots, difficulties, but it will also be the means of showing him the best way of overcoming them.

TRACTION PLOUGHING, ITS COST COMPARED WITH BULLOCK PLOUGHING.—The second feature is the prominence given to Agricultural Engineering especially the question of engine—drawn ploughs. Almost the first thing the Agricultural Engineer put his hand to was the importing of tractor ploughing outfits, opening a training class for operators, of a repair shop for machinery and so on. With a view to pushing on the use of these outfits, the Engineer gives the following figures of cost of ploughing by different kinds of ploughs which may be of interest :—

1. Country plough.		2 ploughs per acre.		
		Rs.	A.	P.
To feed of 10 pairs bullocks ...	...	5	0	0
Wages of ten ploughmen ...	...	4	1	0
Wages of one mate...	...	0	7	0
Depreciation charges @ 10% on cost of bullocks valued at Rs. 2,200	...	0	9	6
Total ...		10	1	6
Per Acre ...		2	0	9
2. Rajah plough.		1 plough $\frac{2}{3}$ or $\frac{2}{3}$ acre.		
To feed of 8 pairs of bullocks ...	...	4	0	0
Wages of eight ploughmen ...	...	3	4	0
Wages of one mate...	...	0	7	0
Depreciation charges @ 10% on cost of bullocks Rs. 1,700	...	0	7	9
Depreciation charges @ 10% on plough shares ...	...	1	0	0
3. Sabul plough		1 plough per acre using two pairs of bullocks per plough.		
		Rs.	A.	P.
To feed of 10 pairs of bullocks ...	...	5	0	0
Wages of five drivers ...	...	1	11	6
Wages of five ploughmen ...	...	2	0	6
Wages of one mate ...	...	0	7	0
Depreciation charges on 20 bullocks ...	...	0	9	6
Total ...		9	12	6
Per acre ...		1	15	3

No. 1 does inferior work and is more costly.

No. 2 does good work in ordinary soil but is no good for hard soil and shares wear very quickly.

No. 3 estimated cost for heavy work. If working in light soil the cost of feed of five pairs of bullocks would be saved making cost of working cheaper than Rajah ploughs by Rs. 2-8-0.

The work done is superior in every way.

Following is report of tractor ploughing, Allahabad, March 1917, Tractor I. H. C. 15/30 H. P. fuel kerosene, lubricating oil, "Oleander."

	Rs.	A.	P.
Fuel consumption, 10 tins ...	27	13	0
Lubricating oil 1 gallon ...	2	0	0
Transmission oil $\frac{1}{2}$ gallon ...	1	0	0
Cup grease ...	0	4	0
Driver ...	1	0	0
Cotton waste ...	0	4	0
Depreciation computed at 10% for 100 days per year over period of 10 years : value of outfit Rs. 8,050 ...	8	0	6
Repairs computed at 2% as above ...	1	9	6
Total ...	41	15	0

Seven acres were ploughed to a depth of not less than 8 inches 8 hours' time. The land was very uneven and varied from sandy loam to a stiff clay full of "kans" roots. Field was nearly square thus necessitating much turning.

Cost per acre for ploughing Rs. 5-15-9.

Report of the Tractor ploughing Gwalior State, June 16, 1917.

Tractor "Mogul" 8—16 H. P. I. H. P.

Fuel, "Swan" Brand kerosene. Lubricating oil, "Oleander."

	Rs.	A.	P.
Fuel consumption $2\frac{1}{2}$ tins ...	5	4	0
Lubricating oil 1 pint ...	0	4	0
Transmission oil $\frac{1}{4}$ pint ...	0	2	0
Cup grease ...	0	1	0
Driver at Re. 1 per day ...	0	6	0
Waste for cleaning ...	0	2	0
Depreciation computed at 10% for 100 days per year over period of 10 years Rs. 5-4-0 per day... ..	1	12	0
Repairs to engine and ploughs at 2% computed as above Rs. 1-1-0 per day..	0	6	0
Total ...	8	5	0

Two acres and 1,200 square feet were ploughed in three hours and fifteen minutes, fuel consumption includes that used in going to and from the field nearly $\frac{1}{4}$ th miles distance. Conditions quite ideal, field long, turns few, soil light sandy loam.

Cost per acre for ploughing not less than 6 inches deep, Rs. 4-2-6.

By using a slightly better grade of fuel the cost would have been reduced about three to four annas per acre.

The above figures speak for themselves. However, it must be remembered that one ploughing with the Tractor is better than two with the Rajah or Sabul and twenty with the country ploughs. Hence for good, quick, efficient work the oil Tractor has the advantage.

PERSONAL NOTES.

We are glad to welcome back Dr. Leslie C. Coleman, Director of Agriculture in Mysore, who returned from furlough and assumed charge of his office on the 9th August 1919.

Dr. B. Narasimha Iyengar, B.A., Ph.D., returned from his long absence of six years in Germany on the evening of the 30th August 1919. Dr. Iyengar passed through a terrible time in that country during these years. We are very glad indeed that he has not only returned safe but also been able to accomplish the object of his deputation. Dr. Iyengar took the Ph. D. Degree in Agricultural Chemistry in August 1917. His thesis was "The action of Potassium Salts on the Phosphoric Acid Assimilation by Plants and the Utilisation of Phosphates." We offer him our cordial welcome.

Mr. M. K. Venkata rao, M.A., Senior Assistant Mycologist, the grant to whom of a Damodar Das Scholarship we announced sometime ago left for Bombay on the 14th August 1919 *en route* to London.

We are glad to state that Mr. Kunhi Kannan, M.A., F.E.S., Senior Assistant Entomologist has also been awarded a Government Scholarship for the study of Entomology abroad.

Mr. K. Bhima Rao, Assistant Chemist, left for Pusa having been deputed by the Government for the study of the Chemistry and manufacture of Indigo for a period of Six months under the Indigo Expert to the Imperial Department of Agriculture.

SELECTIONS.

Vitamines.

Dr. Leonard Hill, F. R. S., gives some interesting information on these remarkable substances in a paper read recently before the Royal Society of Arts, and published in the Journal of that Society (May 9, 1919). Lime and lemon juices contain important vitamins; hence their value against scurvy during an unvaried diet at sea. Recent work tends to show that lemon juice is a specific for *pellagra* as well as for scurvy. (See Physiological Abstracts, April 1919 P. 30). Dr. Hill's article runs as follows :—

Recent research has drawn ever-increasing attention to the accessory dietetic factor—the so-called vitamins. We are adjusted to live on fresh, natural foods, plant and animal tissues (not millers' separated products), and these contain countless substances other than proteins, carbohydrates, and fats. Rickets, scurvy, beriberi, *pellagra*, and many unrecognized pathological conditions are produced by lack of one or other of these substances, some of which are necessary for maintaining metabolism, and others for growth.

Vitamins are of two types ;—(1) water soluble, found in tissues which contain active cells, in the embryonic parts of plants, germ of cereals, yeast, milk, egg, glandular epithelium; (2) fat soluble, constituents of active cells, but not in store fat, e. g., lard, nut-margarine, present in milk, cream, butter, egg yolk, cod liver oil, oil of other glandular tissue, edible green parts of plants.

Of the water soluble vitamins, those which prevent scurvy are easily destroyed by cooking, those which prevent beri-beri, not so.

If white rats are fed on pure milk protein, starch, sugar, fat, and the inorganic salts of milk, there soon results a lethargic condition, unsleek coat, cessation of growth, decline, and death. A few milligrammes of yeast or wheat-germ a day, restore them to full health. If dogs are fed on peasemeal and cotton-seed oil, there result diarrhoea, dermatitis, delirium, and death—the symptoms of *pellagra*. Butter fat cures them like magic. The British garrison in Kut, when rationed on white flour, suffered from beri-beri. The disease disappeared on their sharing in the coarse grain of the Indian soldiers.

Pellagra, prevalent in Turkish prisoners fed chiefly on maize, is cured by broadening the diet. Xerophthalmia, occurring in Scandinavian children, of cream of cod liver oil.

Puppies fed on a certain deficient amount of bread and milk get rickets. The addition of butter fat prevents this (E. Mellanby).

Scurvy resulting from a diet of overcooked and preserved foods at once cured by the addition of fresh vegetables, raw or lightly boiled, orange juice, or the juice of turnips.

The milk of stall-fed cows is poor in vitamins; city mothers fed on vitamin food, yield milk poor in vitamins (E. Mellanby). When babies are fed on diluted cow's milk sweetened by sugar, the water soluble vitamins are brought low in amount. If the appetite fails, deficiency may result, and then endless dietetic troubles follow. It is not improbable that a large part of the difficulties of artificially feeding babies is due to this cause.

In addition to vitamins, experiments on the feeding of rats and chickens have shown that, for adequate growth, a suitable supply of certain amino-acids must be available in the diet. These are the building stones of the proteins, and proteins vary in their content to essential ones. A ration which fails to yield these in reasonable abundance cannot promote the synthesis of new protein, that is growth; but if the other (non-protein) dietary factors are suitable, increment of weight can promptly be brought by the addition of these essential amino-acids.—The Agricultural News, Vol. XVIII No. 449.

Canadian "Better Farming Train."

The Department of Agriculture of Saskatchewan, co-operating with the College of Agriculture of the Provincial University, and the Canadian Pacific Railway Company, will run a Better Farming train over the lines of the Canadian Pacific Railway in the south western portion of the province during one month ending June 28. This service, which is made possible by appropriations from the Agricultural Instruction Act, has become an important annual feature of the agricultural extension work of the province. The train will consist of thirteen lecture and demonstration cars equipped to give instruction on live stock, field husbandry, poultry, farm mechanics, boys' and girls' work, and household science.

The live stock section will comprise three cars of choice live stock supplied by the College of Agriculture. The stock will

include representatives of dairy, beef, and dual purpose cattle, a Clydesdale mare, representatives of Yorkshire, Berkshire, and Tamworth hogs, and some range ewes with their progeny of the first and second crossing, sired by pure bred rams. A covered flat car will be used as a platform on which to display the animals during the demonstrations.

The field husbandry section will comprise one demonstration car containing an attractive display of soil products, charts illustrating results obtained from experimental work with field crops, also one lecture car in which agricultural authorities will discuss local problems relating to tillage methods, moisture conservation, and the growing of cereal, hay, fodder, root, and other crops.

One demonstration car will be used to provide poultry instruction. In this will be carried live specimens of the various breeds of poultry suitable for Saskatchewan. Brooders and incubators in operation will be shown as well as model poultry houses, and other material. Lectures on poultry topics will be given in a special lecture car.

The farm mechanics' section will consist of two cars of mechanical exhibits including sectional models of farm buildings, illustrating convenience of arrangement combined with proper provision for lighting and ventilation; sectional models of steam and gasoline engines, a working model of a pneumatic water supply system, and an electric lighting system suitable for a farm home; model dairy equipment, etc. Lectures on farm layouts, building construction, water supply, the draught of implements, and kindred topics will be given in a special lecture car.

A special section will be devoted to the instruction and entertainment of boys and girls. Lectures, illustrated by lantern pictures, will be given on such topics as birds and insects native to Saskatchewan, public buildings of Saskatchewan, school gardening contests for boys and girls, etc.

Two cars will be devoted to household science, one for lectures and demonstrations, the other, a nursery car in charge of a matron where the younger children will be looked after. Lecturers and demonstrators will deal with such matters as food values and proper cooking, laundering, sewing, sanitation, ventilation, and home nursing. Labour saving devices suited to rural conditions will be displayed.

The tour arranged provides for stops at fifty-eight points at the rate of two a day, *i. e.*, from 9 A.M. to 1 P.M., and from 2-30 to 6-30 o'clock.—The Agricultural Gazette of Canada, June 1919,

Transplanting of Paddy.

That paddy when transplanted yields a better crop is an axiom. The many experiments conducted in conjunction with the Agricultural Society (Ceylon) have given very encouraging results, and in districts where transplanting was not known 15 years ago, it is now the practice always to transplant unless unfavourable weather conditions interfere. Not only does transplanting yield a better crop, but there is a considerable saving of seed paddy. In some districts the seed-rate, when broadcasted, is ridiculously high. If transplanting is adopted, not more than half-a-bushel per acre is necessary. (1 bushel = 45 lbs.)

Of the many experiments of which careful records have been kept, the following may be given for general information :—

Yields in bushels per acre.

Centre.	Method.	Trans- planted.	Broad- casted.
Poraduwa (Matale)	Single seedling 9×9	42	24
Maragoda („)	„ do 4—6	76½	25
Hanwella (Colombo)	„ do 4×6	57½	25
Minneri (Anuradhapura)	„ do 4×9	40	20
Horana	„ do 6×8	96	30
Ambalagonda	„ do 9×9	58	20
Welimada (Uva)	2—3 seedlings 4—5	57	37½
Chilaw	4—6 do 4—6	61	36
Badulla	3 do 7×7	40	30
Peradeniya	3 do 6×6	90	56
Harispattu (Kandy)	3 do 6×6	52	35—40
Badulla	3 do 6×6	60	30
Katugastota	3 & 4 do 4—5	57	37½
Harispattu (Kandy)	3 & 4 do 6×6	60	36
Harispattu („)	3 do 6×6	52	35
Kadugannawa	3 do 6×6	61	40
Godigama	Single seedling 4×4	90	30
Tihagoda (Matara)	3—4 seedlings 4—6	20	10
Kamburupitiya	3—4 do 4—6	24½	8
Owitigama	3—4 do 4—6	25	10

In Madampe (Chilaw district), a yield equal to 66 bushels per acre raised from 8 measures of seed was obtained by transplanting 3 & 4 plants, 6 inches apart against the ordinary yield of 40 bushels with 2 bushels seed.

In the Kandy district, most of the fields are transplanted. The following are some of the more recent experiments :—

Centre (a) Dunuwile.—5 lahas of *selected* seed were sown in nursery and transplanted in bunches of 3 and 4 plants at approximately 6 inches apart and the yield was 62 bushels against a yield of 40 to 45 bushels when transplanted with ordinary seed.

(b) $\frac{3}{5}$ bushel sown in a nursery and seedlings transplanted on $\frac{1}{2}$ acre (3 plants 6×6) gave a yield of 40 bushels per acre.

(c) Gampola.—Seedlings raised from $\frac{1}{2}$ bushel paddy were transplanted in bunches of 3 and 4 plants at approximately 6 inches apart. Yield 45 bushels,

From the above results, it will be seen that no hard-and-fast rule can be laid as regards the distance of transplanting or the number of plants to be put in each hole, both of which depend on the nature of the field, the quality of seed and the preparation of the soil. In Kandy, the following results would show the best methods to adopt is to put 3 plants 6×6 :—

At Gallewele	...	3-4	teedlings	6×6	gave 60 bushels	
„ Watuwila	...	3	„	„	„	57 „
„ Nugawela	...	3	„	„	„	52 „
„ Peradeniya	...	2	„	„	„	90 „
„ Galasiya Pattu Korale	3	„	„	„	„	52 „
„ Kadugannawa	...	3	„	„	„	61 „
„ Dunuwile	...	3-4	„	„	„	62 „
„ Gampola	...	3-4	„	„	„	45 „

Taking the results of all experiments and taking into account methods adopted by experienced cultivators, 3 plants per hole, (4 being the maximum) at distances varying from 6 to 9 inches apart seems to be the method to be recommended. The extra labour of separating the plants so that single plants may be put out, can be avoided.

The age at which seedlings are transplanted is of the greatest importance. No plant should be put out which has made a hard node (joint) at the bottom. Such a plant will only “run away” and will not tiller. The easiest and the best principle to follow is to allow seedlings to grow a week for each month of its “age”. That is, Heeneti (4 months) will grow 4 weeks; Hondarawala (5 months) will grow for 5 weeks; Hatel (6 months) will grow for 6 weeks, etc.

After transplanting the water should be kept at about 1 to 2 inches deep until the plants have caught on. This can readily be seen by the colour of the leaf. When the plants have “caught on” the water can be increased up to about 4 inches.

The average cost of transplanting an acre is approximately Rs. 8-9-0. In Kandy district it is only Rs. 5. The value of seed saved and the value of increased crop amply repay this cost and yield a good profit, but it must not be concluded that transplanting can be carried out in every locality in the Island. A study of the local conditions is necessary. Transplanting can be recommended when water supplies can be depended upon and in good soils.—Tropical Agriculturist, April 1919.

Agricultural Education in the United States of America.

Agricultural education, taken in the broadest sense of the term, may be said to cover all those activities undertaken for the promotion of sound and profitable agriculture of a country. These may be classified as (1) instructional work, (2) investigational work, (3) extension work. By instructional work we mean all the formal teaching of agriculture from the primary schools to the University. The investigational work involves the discovery of new facts and principles pertaining to agriculture. By publicity or extension work is meant the conveyance and dissemination of agricultural information to those who are unable to take advantage of the formal teaching of the schools and colleges. The three great institutions are (1) the Agricultural College, (2) the Experiment Station, (3) the Federal Department of Agriculture.

Instructional Work.—The Agricultural College.

The agricultural colleges were born in the throes of the Civil War—at a time when the very existence of the nation was at stake—when doubt and pessimism seemed to reign supreme. They have had a chequered career. At first they attracted no students. To-day they are crowded. Forty years of failure and twelve years of dazzling success is the epitome of the history of the colleges. Last year 130,000 students were registered in the fifty-three colleges of agriculture in the United States, and of these 16,000 were undergoing a four-years' course for the degree of Agricultural Science. It would take me too long to trace the history of the colleges, but success came when the Federal and State Governments began to invest money liberally in the colleges, and provide them with proper equipment and high-class specialists as teachers.

Twenty years ago the students came to the colleges fresh from the cornfields, with no prior training. Now, however, they must

have a High-School training before they are allowed to enter the colleges. The curriculum has gradually developed in such a way as to secure a unique blend of the vocational and non-vocational in varying proportions, with enough of both to turn out an efficient business man without sacrificing his education as a citizen. The authorities aim at making a good farmer, but they aim, too, at making the student a good citizen as well. Ninety-five per cent. of the students who graduate from the colleges either go on the land or take up some form of agricultural work--teaching, investigational work, or extension work. Of those who do not graduate practically all return to the land. In either case failures are almost unknown.

For those who cannot attend the full courses, short courses extending from two weeks to two months are held, so that they who desire to increase their knowledge of agriculture may do so. These courses are given by specialists, and thousands of farmers were in attendance at the College of Agriculture at the time of my visit.

A feature of most American Colleges of Agriculture is the provision made for the teaching of domestic science and home economics. Within the college is a group of buildings devoted exclusively to the training of young women in domestic science. In the American view both men and women should be equally interested in farm life, and if training is necessary for the one it is equally essential for the other. Consequently regular four-year courses of instruction are provided for women, just as courses in agriculture are provided for men. Ninety-five per cent of the women of America become home-makers sooner or later in their career--some of them become home-breakers too! For that reason, home-making, with all that it implies, forms the principle subject of instruction for women. The object is to teach the principles underlying the proper administration of the household and to study foods, hygiene, nutrition, dietetics, textiles, clothing and household management.

The equipment is usually very complete. Laboratories are fitted with gas stoves and gas, coal, wood and electric ranges. Each girl is provided with a kitchenette, where her work in cooking is done. A practice cottage is associated with every course in home economics. This is usually a six roomed house, furnished and equipped to accommodate five or six students and an instructor in charge. The furnishings are simple and typical of the average American home. The purpose is to provide an opportunity for students to gain practical experience, in managing a household. The students are responsible

for the planning, preparation, and serving of the meals, marketing and household accounting, and cleaning and laundering of the household linen. Emphasis is laid on the importance of a proper system of keeping household accounts. Each girl becomes in turn hostess, cook, waitress, maid, and laundress of the cottage. A feature of the course is the effort made to reduce drudgery in the farm home to a minimum by the use of various types of labour-saving devices, and by the wise planning of the kitchen and kitchen equipment.

The number of students taking courses in home economics range from three hundred to a thousand, according to the size of the college and the number of its rural population. . . . The old idea that anybody can farm and that anybody can cook and manage a home has well-nigh disappeared, and with it the idea that farming means ploughing only, and that the activities of the home are fully represented by the making of hot scones. The schools of home economics have dignified labour by sending forth from their halls not merely cooks, but educated women who, because of their knowledge and skill in the practices and principles of the arts of home, are able to use them as a means of expression for their best endeavours.

The Americans believe that for the young man who takes farming an agricultural education is especially necessary. He faces more difficult problems than any preceding generation of farmers. He must go on to land many times more valuable than his father first occupied and at the same time this land has lost much of its fertility. He must fight against more destructive insect and fungus pests and animal diseases than any farmer preceding him. He faces new problems in management and marketing. He must face these problems not only with experience, but with science as his ally and intelligence broadened by the best education.

In addition to the fifty-three colleges, agriculture is being taught in four thousand High Schools and one hundred thousand elementary schools. America began her agricultural instruction in the colleges and universities. When a supply of highly trained teachers of agriculture was available agricultural education was extended to the high schools. Then, when the elementary teachers had received a training in agriculture, the subject was brought into the elementary schools.

Investigational work.—The Experimental Station.

Agricultural investigation and research work is regarded both in

the United States and Canada as a necessary and vital part of any system of agricultural education, and must form the basis for framing a sound policy for future agricultural development. The American experiment stations were founded by the Federal Government in response to a desire for aid in solving problems in American agriculture, and to perfect methods of improving agricultural practice. There are sixty of these experiment stations, and the average expenditure on each is £18,400 per annum.

Some idea of what a single experiment station has accomplished during the last century may be obtained by considering the results obtained at Wisconsin. It is demonstrable that the added wealth of the State of Wisconsin each year, as a result of the activities of the experiment station, is many times the whole appropriation made by Wisconsin for agricultural education. Of the seven tests widely used in dairying, six originated at the Wisconsin station. The Babcock fat-test invented in 1890, furnished a simple means of paying for milk on the basis of quality and for detecting fraud. It saved the factory more than half of the fat formerly lost in the skim-milk produced in creamery operations. For Wisconsin alone this amounts annually to a saving of over 1,500,000 lbs. of butter. The greatest service of the Babcock fat-test, however, has been in making possible the improvement of dairy cows by eliminating unprofitable animals, and thus giving a scientifically accurate foundation for dairying. The Wisconsin curd-test detects the quality of milk as to taints. The casein-test invented in 1909, registers the casein-content, which is of importance in determining the proper value of milk for cheese making. Many improvements in dairy processes relating to the pasteurization of milk, curing of cheese, have originated at this station.

These tests and experiments made at the Wisconsin station, which together form the most important contribution ever made to the science of dairying, and the work of the Wisconsin Dairy School, have enabled Wisconsin to gain the first rank among the States of the United States in the production of both cheese and butter. Since the Babcock fat-test was discovered the value of the dairy products of the State has increased from £4,000,000 to £16,000,000 per annum. It cannot be doubted that a considerable percentage of this increase has been due to the campaign of investigation and education which has been carried on by the University.

One of the greatest possible improvements in agricultural pro-

duction is through the substitution of improved seed for scrub varieties. Beginning about 1898, efforts were made to develop seeds adapted especially to Wisconsin soil and climatic conditions. New varieties of maize, barley, and oats have been evolved at the station and have added millions of bushels annually to the yields of Wisconsin fields. Though only two-thirds the size of Victoria, and the northern half of the State is mostly poor land in need of drainage, Wisconsin, besides producing £16,000,000 worth of dairy-produce raises 100,000,000 bushels of oats, 70,000,000 bushels of maize, and 25,000,000 bushels of barley.

Extension Work.

The most significant feature in agricultural education in the United States during recent years is the development of the co-operative extension or publicity service in each State of the Union. The object of the extension work is to disseminate as widely as possible the mass of information which has been accumulated as a result of the investigations of the experiment stations and agricultural colleges.

Since the experiment stations were founded there has been gained by patient investigation sufficient exact and detailed knowledge of soils, crops, and farm animals to enable the total wealth from agricultural production to be greatly augmented if the information could be widely disseminated and brought home to the last farm and the last farmer. There are many farmers who regularly secure double and treble the yields of their neighbours. A wire fence frequently divides the grower of a 30-40 bushel crop from the grower of a 10-15 bushel crop. To encourage the many to do what the few are doing is the objective of the extension or publicity work.

The principal forms of extension-work are (1) the county agent scheme, (2) home demonstration agents, (3) boys and girls' clubs. The experience of the last fourteen years has demonstrated fully the value of the county agent as a means of bringing to the people on the farms the results of experience and scientific investigation. Nearly every one of the three thousand counties of the United States has a county agent a trained agriculturist located in the district who works in co-operation with local organizations to advance the agricultural interests and improve agricultural practice in the county.—The New Zealand Journal of Agriculture Vol. XVIII No. 4.

Co-operative Buying and Selling.

(The Agricultural Gazette of Canada for May 1919 gives an account of "Co-operative Buying and Selling" in the different provinces of the Dominion. The following relates to the province of Ontario and is fairly representative of the advanced type of province.—Ed.)

For the promotion and guidance of farmers' co-operative enterprises, the Ontario Department of Agriculture, some few years ago, organized a Co-operation and Markets Branch with a Director at its head, employing a portion of the Agricultural Instruction grant to meet the expenses connected therewith. This branch has done what it could, assisted by the agricultural representatives, to foster and encourage the movement and to direct it along sound and business like lines.

The following general classification of trading organizations is indicated by the returns received:—

- (1) The Farmers, Clubs and associations of farmers for buying commodities in wholesale quantities and for making combined shipments of their products.
- (2) Associations primarily engaged in shipping livestock and live stock products.
- (3) Associations of breeders for the disposal of pure-bred beef and dairy cattle.
- (4) Associations for the marketing of fruit, vegetables and special crops, and for the purchase of supplies.

FARMERS' CLUBS AND KINDRED ORGANIZATIONS.—Farmers' clubs, of which there are from 400 to 600 in the province, comprise associations of farmers, unincorporated for the most part, organized for the purchase of supplies in wholesale quantities, and, to a less general extent, for the sale of their products. In some instances the aims of such clubs are limited to social and educational activities. The supplies purchased consist chiefly of goods that are not readily perishable, such as mill feeds, oil cake, bindertwine, flour, salt, coal, cloverseed, and similar articles. Many clubs experienced more or less difficulty during the war in purchasing supplies owing to price fluctuations and the scarcity of commodities. In some instances clubs ceased buying for the time being and turned their attention to selling with good results. The commodities sold usually consist of cattle and hogs and occasionally, of wool, potatoes and hay.

As a rule clubs of this character are unincorporated but quite

generally they are affiliated with the United Farmers of Ontario, an incorporated company having local branches in many districts. In cases where such affiliation exists the United Farmers constitute the medium through which the clubs transact their business.

The combination of the clubs of a county under one management has been effected in some instances. In Victoria county six clubs co-operate in this way, having a combined membership of 425. Cattle and hogs are shipped, the business in hogs alone was approximately \$ 240,000 for the year.

There are twenty clubs in Grey County, one is incorporated, has a membership of 327, and last year sold \$ 263,000 worth of live stock. The other clubs are not incorporated, but one shipped hay and live-stock to the value of \$ 380,000 last year, while the business of the others ranged from \$ 60,000 to \$ 125,000.

Middlesex county has thirty-five farmers' clubs engaged in buying and selling. Several of them do over \$ 50,000 worth of business, while two have bought and are operating stores and elevators.

Manitoulin Island has thirteen clubs engaged chiefly in the purchase of supplies, and two associations for the sale of live-stock and wool. Of the latter, the Manitoulin Co-operative Association is incorporated doing a business of \$ 50,000, while the Southern Manitoulin Wool Growers' Association handles wool and lambs to the amount of \$ 25,000.

Taken altogether, there are upwards of 200 clubs and associations in the province engaged in shipping live stock.

HOW CLUBS ARE FINANCED.—The shipping of live stock co-operatively has got well under way in many parts of the province. Through the United Farmer's Clubs about one thousand cars of live stock valued at perhaps three million dollars, were marketed co-operatively by members last year. The supplies purchased by clubs and co-operative associations are usually financed by the local banks on the security of members' promissory notes. In such cases, members' notes each, say for fifty dollars, are deposited with the bank and drawn against. The goods are paid for by the member in cash, at the car, and the money is returned to the bank. Interest is charged during the time the funds are in use. The procedure in some instances varies somewhat from that given. In Halton county, for *e. g.* where each member pays \$ 5 for a life membership, the business is financed from the fund thus created. Five per cent is added to the cost of the goods to cover charges, including the managers' two and

one-half per cent commission, and any surplus is rebated. In some clubs, purchases are financed by directors' notes. The simplest form is where members purchase on a cash with order basis.

In cases where commodities are consigned to a commission house for sale, no reserve capital is actually necessary, provided members are willing to wait until proceeds are remitted. This is the plan followed in the majority of cases. When, however, the members demand cash at point of shipment, some arrangement must be made with the bank to finance the transaction. Where the association has no paid up capital, individual notes are given, as in the case of purchasing. The manager then pays for the live stock on delivery, reserving enough to cover charges.

Any surplus is afterwards divided prorata. The Thunder Bay Co-operative Marketing Association, for example, pays fifty per cent on delivery, and the balance when returns come to hand. Each member gives his note for fifty dollars on joining the association.

Managers' Commissions are usually on the basis of a one and one-half per cent on the selling price of the stock sold, or at the rate of so many cents per head. The insurance is sometimes carried by the club as in the case of the Rocklyn and Victoria Clubs in Grey county, which collect fifteen cents per head for cattle and five cents for sheep and hogs.

A good example of a co-operative association doing both buying and selling is that of the Norfolk County Association organized early in 1918, with a membership of 250. This organization has since purchased bran, shorts, oil cake and other feeds in car lots, besides seeds, fertilizers, spray materials and poultry supplies. Vegetables, tomatoes, strawberries were shipped. The association is financed by each member giving a demand note for \$ 100 renewable every three years. All goods are paid for in cash. Any one, whether a member or not, may buy through the association, but only the members participate in the profits, which are divided in proportion to the business done by each.

BREEDERS' ASSOCIATION.—There are several breeders' clubs in the province, the members of which sell their surplus animals by public auction. In Brant county, there are three clubs of this description, consisting of Holstein, Jersey, and Shorthorn cattle breeders respectively. The membership ranges from fifteen to thirty. The Holstein Club sells about \$ 15,000 of pure-bred cattle annually.

FRUIT AND SPECIAL CROP GROWERS.—These comprise associ-

ations of commercial fruit and vegetable growers, apple growers and pure seed growers. In the Niagara district there are seven active co-operative associations of fruit growers, besides three or four others that are more or less quiescent at the present time. The active associations consist of the Vineland Fruit Growers, the Grimbsy Fruit Growers, the St. Catharines Cold Storage Company, and the Niagara; aggregate receipts from sales are estimated at \$ 5,00,000 annually, Vineland contributing more than half of this total.

In the counties of Essex, Kent and Lambton there are a number of vegetable growers' associations, while associations of apple growers are quite numerous in the leading apple districts. There is also the Co-operative Fruit Growers of Ontario, a united company organized for marketing the fruit of the locals. About eighteen locals are thus united. During the war activities practically ceased but steps are now being taken to revive the work. Associations of this character employ a manager to market their out put and to purchase containers, spraying materials, seeds and fertilizers. The methods adopted for conducting the business are similar to those already described. In some instances, members are paid when the returns come in. In other cases they are paid at the end of the season the amount realized less cost of handling. The returns are pooled in the case of some of the apple growers' associations.

Seed circles for the production and sale of registered seed, and egg circles for the co-operative marketing of eggs are other forms of association relating to special departments. Kenora district, for example has a Clover Seed Growers' Association doing a business of about \$15,000. Members are paid \$10 per bushel on account after the seed is cleaned and graded and the balance at the close of the season.

INCORPORATION DESIRABLE.—Previous to 1916, the Ontario Companies Act contained no provision for the incorporation of co-operative companies. This omission has since been remedied by including such companies within the terms of the Act.

Mr. F. C. Har, Director of the Co-operation and Markets Branch of the Ontario Department of Agriculture gives the following reasons why he regards incorporation as desirable :—

- (1) An unincorporated club, having no legal status, is apt to meet with difficulties should occasion arise for an appeal to the courts in connection with the collection of debts, or the settlement of any legal difference.

- (2) In unincorporated companies the liability of members is unlimited. The organization being a co-partnership, each member is liable for all the debts of the concern. Incorporation limits liability to the amount of the members' subscribed shares or capital notes.

This will no doubt explain the reason for the mistrust mentioned by one representative of any scheme for raising funds by promissory-notes.

- (3) The difficulty experienced in determining the legal ownership of property acquired by unincorporated associations, such as real estate, buildings or shares acquired in another company. So long as no untoward events arise, lack of incorporation may not be a disadvantage. If they do occur, however, they are augmented by the fact that an unincorporated association is regarded by the courts as legally non-existent.
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